March 29, 2007

CCN 208540

Mr. Michael Simon
Stationary Source Program Manager
Air Quality Division
Department of Environmental Quality
1410 N. Hilton
Boise, ID 83706

SUBJECT: Request to Revise Permit to Construct No. 011-00022 for the Materials and Fuels Complex Fuel Conditioning Facility at the Idaho National Laboratory

Dear Mr. Simon:

The Department of Energy, Idaho Operations Office (DOE-ID) is seeking to amend Permit to Construct (PTC) No. 011-00022 for the Materials and Fuels Complex (MFC) Fuel Conditioning Facility (FCF) at the Idaho National Laboratory (INL). This revision request involves revised processing descriptions, deletion of current fuel disassembly and processing limits, and incorporation of necessary administrative changes. These changes were initially discussed in your December 20th telephone conversation with Alan Croft and Doug Walker.

Included with this letter is Enclosure I, which describes FCF permitting history and the proposed changes to the current PTC. Also enclosed is the PTC Application Fee and PTC Application Form GI (General Information), which includes the document certification signature as required by IDAPA 58.01.01.123.

Please contact Alan Croft at (208) 526-8119 with any questions or comments.

Sincerely,

James F. Graham, Acting Director
Environmental Compliance

ADC:at

Enclosures

cc: M. L. Adams, DOE-ID, MS 1221
R. V. Furstenau, DOE-ID, MS 1203
J. J. Grossenbacher, INL, MS 3695
A. J. Kraupp, DOE-ID, MS 1226
D. C. Long, DOE-ID, MS 1240
T. L. Perkins, DOE-ID, MS 1216
D. J. Richardson, INL, MS 6144
T. J. Safford, DOE-ID, MS 1216
L. A. Sehlke, INL, MS 3810 (w/o Enc.)
F. B. Williams, INL, MS 3405

bcc: B. R. Adams, MS 6166
B. M. Angle, MS 3405
R. R. Chase, MS 6116
D. Croft, MS 3405
E. D. King, MS 7137
D. V. Laug, MS 6174
T. A. Miller, MS 6164
K. E. Powers, MS 6174
C. A. Reno, MS 3405
P. J. Smith, MS 6164
D. W. Walker, MS 3405
Environmental Correspondence, MS 3405
INL Correspondence Control, MS 3108
J. F. Graham Letter File (JFG-16-07)

Uniform File Code: 6108
Disposition Authority: ENV3-a-2
Retention Schedule: Destroy 5 years after permit expires.

NOTE: Original disposition authority, retention schedule, and Uniform Filing Code applied by the sender may not be appropriate for all recipients. Make adjustments as needed.

FEES RECEIVED FROM FACILITY

Date Stamp (date received in PO)	
	RECEIVED MAR 30 2007 DEPARTMENT OF ENVIRONMENTAL QUALITY STATE AQ PROGRAM
Facility Name	INL - Materials & Fuels Complex Fuel Cond. Facility
Facility Location	Idaho Falls
Fee Type (PTC Application, PTC Processing, T2 Processing)	Revise PTC # 011-00022
Check Number	758530
Check Date	3/29/07
Check Amount	$1,000.00

Enclosure I

MATERIALS AND FUELS COMPLEX FUEL CONDITIONING FACILITY (FCF)
PTC REVISION REQUEST
February, 2007

Historical Summary

A permit to construct (PTC # 0140-0022) to modify the MFC Fuel Conditioning Facility (then called the Hot Fuel Examination Facilty – South) was issued on December 5, 1989. This PTC allowed ANL-W (now MFC) to perform on-site metallurgical processing of spent metallic fuel from the Experimental Breeder Reactor II (EBR-II) and to fabricate new fuel elements as part of the recycling process. At that time EBR-II was still in operation and emissions from both that facility and FCF exhausted through the ANL-W Main Stack (Source # ANL 764-001). Because radiological emissions from the Main Stack had the potential to result in a dose rate greater than 0.1 mrem/yr to the nearest member of the public, the Main Stack was equipped with a continuous emission monitoring (CEM) system.

Following the permanent shutdown of EBR-II in October 1994, the emphasis of FCF shifted from fuel recycling to electrometallurgical treatment of sodium-bonded spent nuclear fuel. A three year testing program to demonstrate the feasibility of this treatment technology was successfully completed in August 1999 and the Final Environmental Impact Statement (DOE/EIS-0306) for the Treatment and Management of Sodium-Bonded Spent Nuclear Fuel was issued in July 2000. The EIS identified electrometallurgical treatment at ANL-W as the preferred alternative for the treatment of the sodium-bonded fuel and this alternative was subsequently selected by DOE. Treatment of the EBR-II sodium-bonded fuel commenced at FCF in September 2000, and this was to be followed by processing of FERMI-1, Fast Flux Test Facility (FFTF), and smaller amounts of other sodium-bonded fuels.

The FCF PTC has been amended twice since it was first issued in 1989. The first revision (June 26, 2000) provided for reactivation of the Hot Repair Area at FCF and changed the PTC number from 0140-0022 to 011-00022 to correspond with other ANL-W PTCs.

The second amendment request was more extensive and resulted in the current version of the PTC (issued May 9, 2001). This revision consolidated repetitive language, replaced obsolete requirements, deleted processes that were no longer performed (including fuel fabrication), and generally updated the permit to reflect more recently issued PTCs. The size of the permit was reduced from 23 pages to 8 pages. The process description contained in the current permit specifically addresses the disassembly and processing of fuel assemblies and maintains the same 30-day and annual fuel disassembly and processing rates that were specified in the original permit. Remote fuel fabrication activities that had been part of FCF operations from the 1960's through the 1994 reactor shutdown are not described in the 2001 PTC.

Current Status of FCF

The primary mission at FCF continues to be electrometallurgical treatment of sodium-bonded spent nuclear fuel and this will be the case for several years to come. Both driver and blanket fuel are currently in process although processing of the smaller inventory of driver fuel will be completed more quickly. Modeling performed in support of DOE/EIS-0306 estimated a

cumulative dose to the maximally exposed off-site individual to be 1.98E-03 mrem over the projected 12-year life of the project. It was also estimated in the EIS that tritium (H-3) and krypton-85 releases would account for greater than 99.9% of the radiological dose impact to the public.

Since processing of the sodium-bonded SNF has commenced, radiological emissions from FCF through the ANL-W (now MFC) Main Stack have always been well below those levels which, when combined with that of other INL sources, could result in an off-site dose to the nearest member of the public in excess of the 10 mrem/yr standard.

Because FCF operates under a PTC and is equipped with a CEM system, it is not unusual for the facility to be considered as a location for other projects, including those involving remote fuel fabrication. This type of work is comparable in many respects to fuel fabrication activities performed historically at FCF as part of the fuel recycling process. Much of the processing equipment used in previous fuel fabrication work remains within FCF cells and is expected to be adaptable for future fuel fabrication projects.

Presently planned for installation at FCF is the Research Scale Fuel Fabrication Facility (RSFFF) Metal Fuel Module which will demonstrate all aspects of remote metal fuel fabrication technology on a small scale. Also proposed for FCF is an oxide fuel fabrication capability to serve as a backup to the metal fuels program and to the primary oxide fuel demonstration program that will be conducted at a different National Laboratory. Successful demonstrations of RSFFF technology using both metal and oxide fuels are essential to the approval, design and future construction of the Advanced Fuel Cycle Facility (AFCF) at a yet to be determined location. The addition of small-scale fuel fabrication work to current FCF operations will result in radiological emissions that will remain well below those historical levels encountered during EBR-II reactor operation and fuel recycling. Any radiological emissions from the RSFFF project, added to those from sodium-bonded fuel processing, will be continuously monitored and are expected to have a negligible effect on the INL off-site dose rate.

Even though foreseeable work to be conducted at FCF is expected to fit within the operational history of the facility, DOE will continue to evaluate proposed projects for potential impact on emissions and on the resultant off-site dose rate.

Summary of PTC Revision Request

DOE believes this amendment request does not constitute a modification as defined in the State of Idaho Air Regulations (IDAPA 16.01.01.006). The purpose is to update administrative information, request deletion of some of the current permit requirements, restore previously deleted process information, and by so doing, broaden the scope and flexibility of the permit.

Generally, these proposed changes include:

- Update the PTC to incorporate administrative changes. These include Permittee Name, Facility Contact, Responsible Official, etc. Permittee name headings on subsequent permit pages also need to be updated.

- Revise permit language to describe present and future FCF radiological operations on a more general basis.

- Delete the 30-day and annual disassembly and processing limits of fuel assemblies in the air and argon cells, and the 10 and 15 percent heavy metal burn-up requirements.

Suggested permit changes on a page by page basis and justifications for the proposed actions are specified below.

Requested Changes to PTC # 011-00022 (as amended 5/9/01):

Page 1 of 8

- 1. PERMITTEE: **U.S. Department of Energy, Idaho Operations Office (DOE-Idaho)**
- 2. PROJECT: **MFC Fuel Conditioning Facility (FCF)**
- 3. MAILING ADDRESS: **1955 Fremont Ave Idaho Falls, ID 83401**
- 4. FACILITY CONTACT: **Timothy A. Miller**
  TITLE: **Program Environmental Lead – MFC, Battelle Energy Alliance**
  TELEPHONE: **(208) 533-7741**
- 5. RESPONSIBLE OFFICIALS:
  Manager, DOE-Idaho
  Vice President, Battelle Energy Alliance, LLC
  TELEPHONE: **Obtain telephone numbers through facility contact, if necessary**
- 7. GENERAL NATURE OF BUSINESS & KINDS OF PRODUCTS:
  Spent Fuel Treatment and Energy Research and Development
- 8. **Change SIC No. to 8733**

Pages 2 through 8

- Change name of Permittee in heading to: **U.S. Department of Energy, Idaho Operations Office**

Pages 2 and 3 of 8

- Section 1.1: Change ANL-W Main Stack to **MFC Main Stack**
- Section 1.1.2: Air Cell System - Rewrite the first paragraph as follows: **The air cell is used for the disassembly of fuel assemblies into fuel elements prior to further processing in the argon cell. Routine operations typically include, but are not limited to, the handling of complete fuel assemblies, clad fuel elements, packaged process product, in-cell samples and remote handled waste. Fuel pin loading, capsule welding, leak testing and radiography activities will also be performed within the air cell as part of the fuel fabrication process.**

- Section 1.1.3: Argon Cell System – Rewrite the first paragraph as follows:
  Argon cell operations typically include, but are not limited to: electrometallurgical treatment of sodium-bonded spent nuclear fuel, fuel fabrication and analysis, preparation of radiological waste streams for final disposal, and various other fuels related work. Actinides recovered from the electrorefining process are used as the primary feedstock for metal fuel fabrication activities in the argon cell.

  Delete the second paragraph of Section 1.1.3

Justification
Fuel fabrication, waste treatment, and related projects have long been part of the operational history of FCF. These operations were part of the EBR-II fuel recycling programs and continued until the EBR-II reactor was shut down in 1994. When the long term sodium-bonded SNF treatment project began in CY 2000, the capability to fabricate fuel at FCF was no longer immediately available even though most of the original processing equipment remained within the argon cell. Since there were no foreseeable plans to perform this type of work, fuel fabrication language was removed when the PTC underwent a major revision in 2001. With the planned RSFFF project on the horizon, however, and with an increased emphasis on fuel recycling, and with the potential for other fuel fabrication projects, DOE believes that it is important to restore a basic description of those activities back into the PTC. Currently planned demonstration projects involving remote fuel fabrication technology will be performed on a significantly smaller scale than historical fuel fabrication operations.

Pages 3 and 4 of 8

- Section 2.1: Change ANL-W Main Stack to **MFC Main Stack** and DOE/INEEL to **DOE/INL.**

- **Delete Sections 3.2 (Air Cell Processing Rate) and 3.3 (Argon Cell Processing Rate)**

Justification
The 30-day and annual fuel disassembly and processing limits for the Fuel Conditioning Facility were established in the original 1989 permit and have been carried over into the current PTC. Over this time period, highly enriched driver fuel assemblies and low enriched blanket material assemblies have been counted as equivalents for compliance purposes, when in fact, the assemblies are very different in terms of both heavy metal mass and enrichment. For EBR-II fuel, a driver fuel assembly has a mass of ~5 kg and a blanket material assembly has a mass of ~48 kg. In addition to the inconsistency between the types of fuel assemblies, processing of the driver fuel has reached the point where the remaining inventory is no longer in assembly form but consists of loose elements.

DOE believes that deletion of the processing rate limits is appropriate because these limits are not necessary to maintain and demonstrate compliance with the INL off-site dose rate limit of 10 mrem/yr nor do they have a discernable limiting effect on the exposure that FCF radiation workers may receive. The limits may have been justifiable when the EBR-II reactor was in operation and spent fuel removed from the reactor for recycling was higher in radioactivity but this is no longer the case. EBR-II was shut down in 1994 and fuel presently being processed has been in storage for many years with a resultant drop in radioactivity. Both actual and potential radiological emissions from the MFC Main Stack have decreased since 1994 and are not expected to return to historical levels.

Since commencement of sodium-bonded spent fuel treatment began in CY 2000, the 30-day and annual processing rates have never come close to exceeding the PTC limits. Processing rates are expected to remain relatively constant over the life of the project because of facility processing capabilities. Deletion of the PTC limits, however, will result in a reduction of paperwork and increased scheduling efficiency as fuel shipments are received, prepared and processed. Compliance with the PTC can also be more easily demonstrated.

DOE will continue to ensure that emissions from the MFC Main Stack are continuously monitored and that annual emissions are incorporated into the annual INL NESHAP Report. This will demonstrate that FCF emissions, when combined with those of other INL sources, will result in an off-site dose rate to the nearest member of the public that remains in compliance with the 10 mrem/yr standard required under 40CFR 61.92. The CEM system can also detect and alert personnel to any real time abnormal or unexpected release that may have the potential to impact INL workers, the general public, or the environment. Compliance with the 10 mrem/yr standard is specified in Section 2.1 of this PTC and in Section 2.15 of the INL Title V Operating Permit.

Page 4 of 8

- Change Section 3.4 to **Section 3.2**
- Change Section 3.5 to **Section 3.3**
- Add a new Section **4.3** as follows:

The Permittee shall continuously monitor radionuclide emissions from FCF through the MFC Main Stack. Routine (monthly) air filter samples will be collected and transferred to the MFC Analytical Laboratory for analysis. An ongoing record of emissions will be maintained by the Permittee.

- Add a new Section **4.4** as follows:

The Permittee shall monitor all fuels-related material processed through the Fuel Conditioning Facility and maintain an ongoing record of that throughput.

- **Delete Section 5.2**

Justification
Assuming that 30-day and annual processing rate limits are removed from the PTC, the quarterly record of fuel processing and the record of exceedances as specified in Section 5.2 should no longer be applicable. New Sections 4.3 and 4.4 will replace Section 5.2.

Page 5 of 8 (Appendix A)

- Section 1.1: Change ANL-W Main Stack to **MFC Main Stack**

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 877-5PERMIT

PERMIT TO CONSTRUCT APPLICATION

Revision 1
01/11/07

Please see instructions on page 2 before filling out the form.

All information is required. If information is missing, the application will not be processed.

IDENTIFICATION	
1. Company Name	U.S. Department of Energy, Idaho Operations Office
2. Facility Name (if different than #1)	Materials and Fuels Complex – Fuel Conditioning Facility
3. Facility I.D. No.	011-00022
4. Brief Project Description:	Revise PTC No. 011-00022 for the Fuel Conditioning Facility (See Enclosure I)
FACILITY INFORMATION	
5. Owned/operated by: (√ if applicable)	x Federal government ☐ County government ☐ State government ☐ City government
6. Primary Facility Permit Contact Person/Title	Timothy A. Miller / Program Environmental Lead - MFC, Battelle Energy Alliance
7. Telephone Number and Email Address	(208) 533-7741 Timothy.Miller@inl.gov
8. Alternate Facility Contact Person/Title	Timothy J. Safford / Environmental Technical Support, DOE-Idaho
9. Telephone Number and Email Address	(208) 526-5670 SAFFORTJ@ID.DOE.GOV
10. Address to which permit should be sent	1955 Fremont Avenue
11. City/State/Zip	Idaho Falls, ID 83401
12. Equipment Location Address (if different than #10)	Materials and Fuels Complex – Fuel Conditioning Facility (FCF)
13. City/State/Zip	Idaho National Laboratory Site (INL)
14. Is the Equipment Portable?	☐ Yes x No
15. SIC Code(s) and NAISC Code	Primary SIC: 8733 Secondary SIC (if any): NAICS: 541710
16. Brief Business Description and Principal Product	Spent Fuel Treatment and Energy Research and Development
17. Identify any adjacent or contiguous facility that this company owns and/or operates	FCF is located at the Materials and Fuels Complex at the INL
PERMIT APPLICATION TYPE	
18. Specify Reason for Application	☐ New Facility ☐ New Source at Existing Facility x Revise Existing Permit: Permit No.:011-00022 Date Issued: May 9, 2001 ☐ Unpermitted Existing Source: ☐ Required by Enforcement Action: Case No.:

CERTIFICATION

IN ACCORDANCE WITH IDAPA 58.01.01.123 (RULES FOR THE CONTROL OF AIR POLLUTION IN IDAHO), I CERTIFY BASED ON INFORMATION AND BELIEF FORMED AFTER REASONABLE INQUIRY, THE STATEMENTS AND INFORMATION IN THE DOCUMENT ARE TRUE, ACCURATE, AND COMPLETE.

19. Responsible Official's Name/Title	Elizabeth D. Sellers, Manager, DOE-Idaho / Fran B. Williams, ESH&Q Director, BEA	
20. RESPONSIBLE OFFICIAL SIGNATURE	See Attached Certification Sheet (Enclosure I)	Date:

21. x Check here to indicate you would like to review a draft permit prior to final issuance.

ENCLOSURE I

U. S. DEPARTMENT OF ENERGY – IDAHO OPERATIONS OFFICE

MATERIALS AND FUELS COMPLEX FUEL CONDITIONING FACILITY

Request to Revise Permit to Construct No. 011-00022

CERTIFICATION

In accordance with IDAPA 58.01.01.123 (Rules for the Control of Air Pollution in Idaho), I certify based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

Signed: FB Williams Date: 3/21/07
Fran B. Williams
ESH&Q Director, Battelle Energy Alliance, LLC

Signed: Elizabeth D Sellers Date: 3/27/07
Elizabeth D. Sellers
Manager, Department of Energy – Idaho Operations Office